Q. **Reference: 2018 Cost of Service Methodology Review Report, page 8, lines 6-8**

Hydro recommends that the power purchase costs resulting from the Muskrat Falls Project, including the generation, the LIL and the LTA, be functionalized as generation. The Brattle Group in its report at page 16, lines 1-3 recommends that while the generation should be functionalized as generation, the LIL and LTA should be functionalized as transmission. The basis for this recommendation is set out at pages 16-19. Explain in detail whether or not (i) Hydro and (ii) CA Energy agree with Brattle's recommendation in this regard.

A. a) Newfoundland and Labrador Hydro's Response

Newfoundland and Labrador Hydro ("Hydro") does not agree that the Labrador-Island Link ("LIL") and the Labrador Transmission Assets ("LTA") should be functionalized as transmission and classified as 100% demand-related. In Hydro's opinion, The Brattle Group, Inc. ("Brattle") has not provided an evidentiary basis from a cost causality perspective to support its recommendation. Hydro believes The Board of Commissioners of Public Utilities' (the "Board") reasons supporting its methodological decisions in its Proposed Cost of Service Methodology, February 1993,[1] ("1993 Cost of Service Report") provide guidance to evaluate methodological recommendation differences between Hydro and Brattle with respect to the functionalization of the LIL and the LTA.

[1] "A Referral By Newfoundland and Labrador Hydro for The Proposed Cost of Service Methodology and a Proposed Method for Adjusting its Rate Stabilization Plan to Take Into Account the Variation in Hydro's Rural Revenues Resulting from Variations in the Rates Set by the Board to be Charged by Newfoundland Light & Power Co. Limited to its Customers," Board of Commissioners of Public Utilities, February 1993.

Approved for Release	Date: 16 OCT /2012

SYSTEM PLANNING GUIDELINE

Assignment of Plant
For
Cost of Service

Date: October 15, 2012

System Planning Department

newfoundland labrador hydro
a nalcor energy company

System Planning Guideline Assignment of Plant For Cost of Service			
Revision	Date	Comments	By
0	Aug 15, 2003	Original Draft	PWT
1	April 14, 2005	Quick references added	PWT
2	Oct 15, 2012	Reformat, Vale and Aur Added	PWT

TABLE OF CONTENTS

INTRODUCTION

In order to properly allocate plant for cost of service there must be clear guidelines. To date there have been definitions of common and specifically assigned plant provided as part of testimony at rate hearings and from PUB recommendations (i.e. subfunction subtransmission as a case in point). The application of the definitions has ultimately come from interpretations of PUB rulings and recommendations. Yet a review of the recommendations from the 1992 and 1995 hearings demonstrate inconsistencies in the application of definitions. To assist in the consistent application of plant assignment on the Island Interconnected System, and to assist with the subjective terminology such as "significant", System Planning has reviewed the past practices of plant assignment and has drafted the following guidelines for assignment of plant.

BACKGROUND

Newfoundland and Labrador Hydro (NLH) has organized its cost of service into five separate systems including Island Interconnected, Island Isolated, Labrador Interconnected, Labrador Isolated and L'Anse au Loup. Given that a number of assets may be used in support of more than one system (i.e. Hydro Place), the cost of service includes a system called All Systems General Plant to properly account for these assets. NLH purchases its revenue meters in bulk and maintains an inventory at its meter shop. Until the meter is installed in the field, it is impossible to determine which system should be assigned the cost of the meter purchase. In order to account for bulk meter purchases, the cost of service includes a system called All Systems Meters. Finally, there are two other systems used to identify assets that are not included in the cost of service: Churchill Falls and Muskrat Falls.

In order to achieve cost recovery, a cost of service methodology requires that the cost (capital and maintenance) of each piece of plant be assigned to the appropriate customer(s) in a fair and equitable manner. The following guidelines are applied to the Island Interconnected System.

DEFINITIONS

System

In the general context, system refers to the electrical system, or all current carrying components, which are connected together and enable electricity to be generated and consumed. Lack of a current carrying path between two communities (i.e. St. John's and Happy Valley) implies separate systems. For the purposes of the cost of service, system includes not only the current carrying components, but also the assets/plant that are required to support and maintain the system (i.e. buildings, vehicles, etc.).

Island Interconnected System

The Island Interconnected System refers to all those assets electrically connected to, or in support of, NLH's large generating stations (i.e. Bay d'Espoir, Holyrood) on the Island portion of the Province.

Island Isolated Systems

A number of areas on the Island portion of the Province are not in close proximity to the Island Interconnected System, making it more cost effective to supply electricity from local diesel generating plants. These isolated diesel plants on the Island, including assets in support of the plants are referred to as the Island Isolated Systems.

Labrador Interconnected System

The Labrador Interconnected System refers to all NLH assets connected to the Churchill Falls Generating Station including Labrador City, Wabush and Happy Valley/Goose Bay.

Labrador Isolated Systems

Similar to the Island, there are a number of communities in Labrador, which are supplied by local diesel generating plants. These isolated diesel plants, including assets in support of the plants are referred to as the Labrador Isolated Systems.

L'Anse au Loup System

The south coast of Labrador is supplied by an electrical system containing a diesel plant at L'Anse au Loup and a connection to the isolated Hydro Quebec system supplied by the Lac Robinson hydro-electric facility.

Customer

For the purposes of the cost of service, customer is defined as a purchaser of firm electrical energy from NLH. Customers of NLH include Newfoundland Power, each

individual large industrial, and the grouping known as NLH's rural rate classes (i.e. Hydro Rural).

Common Plant

Common plant is defined as plant that is of benefit to two or more customers. Costs for common plant is assigned to all customers of the system with the individual portion of the cost being derived based upon factors such as usage.

Specifically Assigned

Specifically assigned plant is defined as plant that is of benefit to only one customer. Costs for specifically assigned plant are assigned directly to the benefiting customer.

Production Function

The production function is defined as plant whose primary role is generating electric power and energy, or connecting the generator to the grid.

Transmission Function

The transmission function is defined as high voltage transmission line plant (66 kV and above) whose primary role is to transmit electric power and energy from one point on the grid to a second point on the grid.

Terminals Function

The terminals function is defined as high voltage terminal station plant (66 kV and above) whose primary role is to connect generation to high voltage transmission line plant and high voltage transmission line plant to distribution plant.

Distribution Function

The distribution function is defined as low voltage plant (46 kV and below) whose primary role is to supply electric power and energy to a single geographic group of NLH rural rate classes.

Common Island Generation

All production facilities (hydraulic, thermal, gas turbine and diesel) owned and operated by NLH on the Island portion of the Province, with the exception of Isolated Rural

Generation, is of benefit to all Island Interconnected customers and therefore is assigned common.

Common Labrador Generation

All production facilities (hydraulic, thermal, gas turbine and diesel) owned and operated by NLH in Labrador, with the exception of Isolated Rural Generation, is of benefit to all Island Interconnected customers and therefore is assigned common.

Isolated Rural Generation

All production facilities (hydraulic, thermal, gas turbine and diesel) owned and operated by NLH in the Province of Newfoundland and Labrador that is not electrically connected to either the Island Interconnected System or the Labrador Interconnected System.

Common Transmission & Terminals

- All transmission and terminal plant that is of benefit to two or more customers.

- All transmission and terminal plant whose sole function is the interconnection of a generating facility with the grid. Transmission and terminal plant in this category have their costs classified on the same basis as the generation that it interconnects.

- All transmission and terminal plant that connects a single customer and generation or voltage support equipment, that is of substantial benefit to more than one customer.

Specifically Assigned Transmission & Terminals

All transmission and terminal plant that is of benefit to only one customer.

All of NLH's generation and distribution facilities in the Isolated Rural Systems and distribution facilities in the interconnected systems are assigned to Hydro Rural.

Sub-transmission Hydro Rural

All transmission and terminal plant serving only NLH rural rate classes.

NP-IC Sub-transmission

All transmission and terminal plant serving both Newfoundland Power and an Industrial Customer but not Hydro Rural and has an original cost of at least 2% of the total transmission and terminal station costs.

Terminal Station

A NLH station containing equipment having a nominal phase-to-phase voltage rating of 66 kV or above.

Substation

A NLH station containing one or more power transformers, which change the nominal operating voltage from one distribution voltage level to another distribution voltage level (i.e. 25 kV to 12.5 kV).

Recloser Station

A NLH station containing one or more distribution class reclosers.

COST OF SERVICE CODES IN JDE

COS System Codes

The cost of service identifies the system location of a fixed asset based upon a three letter acronym in the appropriate field of the fixed asset record in JDE. The following table provides the code (acronym) for each system in the cost of service.

System Codes for Fixed Assets	
Code	System
ASG	All Systems General Plant (i.e. Hydro Place computers)
ASM	All Systems Meters (i.e. bulk meter purchases by Meter Shop)
INT	Island Interconnected
ISO	Island Isolated
LSO	Labrador Isolated
LAL	L'Anse au Loup
LIN	Labrador Interconnected
CHF	Churchill Falls
MUF	Muskrat Falls
HYS	Unallocated System

COS Customer Codes

The cost of service identifies the customer assignment of a fixed asset based upon a two-digit code placed in the appropriate field of the fixed asset record in JDE. The following table provides the codes assigned to each customer.

Customer Codes for Fixed Assets	
Code	Customer
01	Common
02	Newfoundland Power
03	Hydro Rural
05	North Atlantic Refining Limited
06	Deer Lake Power
07	Abitibi Consolidated – Grand Falls
08	Vale[1]
09	Non-regulated
10	CFB Goose Bay
11	Aur Resources
12	Corner Brook Pulp and Paper
20	Common – Exclude from O&M
30	Newfoundland Power – Exclude from O&M
40	Hydro Rural – Exclude from O&M
98	General Plant, Vehicles, Telecontrol, Computers
99	Muskrat Falls
Notes 1. Was Abitibi Consolidated - Stephenville	

One will note that customers 20, 30 and 40 are excluded from O&M. These three codes are used to assign the cost of an asset (i.e. depreciation and interest) to the appropriate customer, when the customer is billed directly for maintenance costs as they are incurred by NLH, or where the customer actually performs the maintenance. As a result, an asset with one of these three customer codes is excluded from the operation and maintenance calculations within the cost of service to avoid double billing the customer for O&M on the asset.

COS Function Codes

The cost of service identifies the function of a fixed asset based upon a three-digit code placed in the appropriate field of the fixed asset record in JDE. The following table provides the codes for each function.

Function Codes for Fixed Assets	
Code	Function
100	Generation (No Longer Used)
110	Hydraulic Generation
112	Hydraulic (Prev Trans) - No Longer Used
120	Thermal Generation
125	Diesel Generation
130	Gas Turbine Generation
150	IS&T
190	Generation - Other
200	Transmission Lines
210	Sub-Transmission – Rural
220	Terminal Stations
300	Distribution
310	Distribution Substations
320	Distribution Submarine Cables
330	Distribution Primary (conductor, gang operated disconnect switch, disconnect switch, voltage regulator, recloser, sectionalizer, platform)
340	Distribution Transformers
350	Distribution Secondary (conductor)
360	Distribution Meters
370	Distribution Services (service conductor)
380	Distribution Street Lights
390	Distribution Poles (poles and pole hardware)
395	Distn - Land/Land Improvements
400	Churchill Falls
500	Customer Related
800	General Plant (vehicles, ATV, snowmobiles, computers, telecontrol)

Major Accounting Class Codes

Fixed asset records in JDE contain a three-digit field for major accounting class. This fixed asset accounting class is not to be confused with the asset classification in the cost of service. Recall that asset classification within the cost of service details the split between demand, energy and customer. The fixed asset accounting class code provides, among other things, the depreciation method. While the accounting class code is determined by the finance department, knowledge of the codes can be beneficial during the assignment and functionalization of fixed assets. The following table summarizes the fixed asset accounting class codes.

Major Accounting Class Codes for Fixed Assets	
Code	Accounting Class
007	Hydraulic Generation
009	Hydraulic Generation – mini hydro
011	Thermal Generation
013	Gas Turbines
015	Diesel Generation
016	Wind Hydrogen Generation
017	Transmission Lines
019	Transmission Lines – TL257
021	Terminal Stations
023	Substations Distribution
025	Distribution
027	Meters
028	Info Systems & Telecontrol Assets
029	General Plant
031	Feasibility Studies – Short Term
095	Feasibility Studies – Long Term
097	Computer Software
350	Non Depreciable Equipment
409	CIAC Hydraulic Generation
411	CIAC Thermal Generation
413	CIAC Gas Turbine
415	CIAC Diesel Generation
419	CIAC Transmission
420	CIAC Wind Generation
425	CIAC Distribution
429	CIAC General Plant
497	CIAC Computer Software

The accounting class codes 007, 009, 011, 013 and 015 usually refer to assets contained within the generating station building or powerhouse, and for the most part can be married with the appropriate function code (i.e. accounting class 011 Thermal Generation assets should have function code 120 – Thermal Generation, accounting code 013 Gas Turbine with function code 130 – Gas Turbine, and so on). Once the focus moves from the generating station to the assets in the connected terminal station and transmission system, the one to one match between accounting class and function code cannot be used exclusively for verification of customer assignment or functionalization.

With the exception of TL257 (St. Anthony Airport to Roddickton Woodchip), all NLH transmission lines, 66 kV and above, have accounting class 017. One may recall that TL257 was constructed prior to the interconnection of the St. Anthony Roddickton System to the grid and the amalgamation of PDD into NLH. As a PDD asset, TL257 was depreciated differently, and thus class 019.

All NLH owned high voltage substations (commonly referred to as Terminal Stations) containing bus voltages of 66 kV or above have accounting class 021. This would include the 12.5 kV equipment in the 66/12.5 kV terminal stations supplying Hydro Rural. Despite the high voltage station accounting class 021, it is appropriate from a cost of service perspective to functionalize the 66/12.5 kV power transformer and 12.5 kV station equipment (i.e. reclosers, voltage regulators) to 310 – Distribution Substations. The combination of class 021 and function 310 ensures that the costs are allocated properly.

Class 021 assets also include the terminal stations associated with generating stations. As an example, the terminal station equipment at Upper Salmon including the 230 kV circuit breakers, 230 kV disconnect switches and 230/13.8 kV power transformer is considered accounting class 021 – Substation Transmission fixed assets. Functionalizing these assets as 110 – Hydraulic Generation ensures that costs are allocated properly.

All NLH owned low voltage substations (commonly referred to as distribution substations) containing bus voltage of 46 kV and below have accounting class 023. The 25/12.5 kV substation at St. Lunaire in the St. Anthony Distribution System is an example of an accounting class 023 asset. It is appropriate to functionalize these class 023 assets to 310 – Distribution Substations.

PROCESS OF PLANT ASSIGNMENT

The Asset Management Database is the tool used by NLH to add plant, transfer plant from one location to another, retire plant or modify plant records in JDE. For new plant additions, System Planning is required to input system, function and customer COS codes as part of the Asset Management Process prior to the plant record being posted in JDE. For transfers and modifications of plant, the Asset Management Process provides notification to System Planning that there has been a change made to the asset, or piece of plant, and requests that System Planning review the change to ensure COS codes do not need to be changed. Should changes in COS codes be required, the Asset Management Process permits System Planning the initiate a modification request to change the appropriate COS codes.

The assignment of plant requires an understanding of power system planning (i.e. the big picture), power system operation (i.e. philosophy and limitations), equipment application (i.e. the role of each asset) and so on. The assignment of plant is completed at a high level using a system single line diagram to identify the system components. For each component (i.e. generator, transmission line, breaker, etc) the following question is asked:

To which system does this component belong?

The answer to this question identifies the COS system code.

The existing cost of service methodology assigns plant as either “common” or “specifically assigned”. This raises the question:

Who benefits from this piece of equipment being installed?

The answer to the question determines whether the asset is common or should be specifically assigned. At this point a customer code can be given to the asset.

Once the customer has been determined the next question is asked:

What is the function or role of this piece of equipment?

The answer enables one to give the asset a function code.

Once all plant has been assigned, each individual plant's function is used to break down total costs for the cost of service. Following functionalization of assigned plant, the cost of service methodology provides classification rules to break down the cost of plant into demand, energy and customer classifications. The split between the three classes differs based upon function. The methodology and rules are beyond the scope of this document.

GUIDELINES

The following guidelines are used to ensure consistency in the assignment of plant across NLH systems.

Assigning Generation

In interconnected systems generating stations are generally scattered rather than centrally located. Hydroelectric stations are located where sufficient water flows and head exist. Thermal generating stations are located near fuel sources or on deep water ports for fuel delivery. Peaking plants such as combustion turbine or diesel may be located near major load centers. The generation mix at any point in time is dependent upon unit availability, plant efficiencies, economics and demand. Regardless of location, installed generation is of benefit to all customers as the utility operates generation to supply all connected customers in the most efficient manner given unit availability at any point in time.

Based upon the definitions, all generation on the Island Interconnected System is of benefit to all customers and is therefore Common - customer 01. The function to be given to the individual generating plant is merely based upon the type of generation. Island Interconnected hydro plants, regardless of size, are functionalized 110 – Hydraulic, Holyrood is functionalized 120 – Thermal and so on. Note that the same would hold true for generation on the Labrador Interconnected System. The only question is the location of the "cutoff point" (i.e. where does generation end and transmission and terminals begin?). For the purposes of assigning generation assets the following guidelines are used:

> ***Generation Assignment Guideline #1 – All hydraulic and thermal generation assets, including terminal station components, up to and including the high voltage bus at the generating station are assigned Common – customer 01, and functionalized the same as the generator (i.e. Function 110 – Hydraulic Generation or Function 120 – Thermal Generation).***
>
> ***Generation Assignment Guideline #2 – Given that gas turbines and diesel are installed near load centers, the application has a tendency to make the affected terminal station multi-functional. All gas turbine and diesel generating assets, including the unit step up transformer and high voltage switch and/or circuit breaker are assigned Common – customer 01, and functionalized the same as the***

generator (i.e. Function 125 – Diesel Generation or Function 130 – Gas Turbine Generation).

Figure 1 provides an example of the application of Generation Assignment Guideline #2.

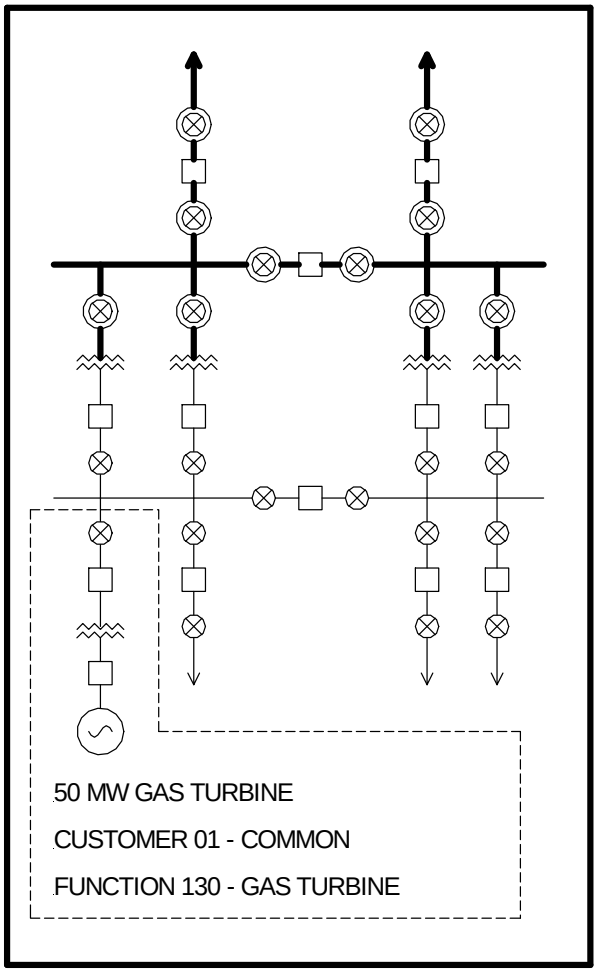

Figure 1

Assigning Transmission Lines and Terminal Stations

At the center of the interconnected power system is a high voltage transmission network that connects all generation to load centers. Because it connects multiple generation sites and customers together, the high voltage transmission network, or backbone, is considers a common asset as it is of benefit to all customers connected to it. For without the backbone, the grid itself would not exist. On the Island Interconnected System, the 230 kV transmission network forms the backbone of the grid.

Transmission and Terminals Assignment Guideline #1 – All non-radial 230 kV transmission lines and associated terminal station equipment connecting generation and load centers are assigned Common – customer 01. The transmission lines are functionalized 200 – Transmission and the terminal station equipment is functionalized 220 – Terminal Stations.

Transmission and Terminals Assignment Guideline #2 – All radial 230 kV transmission lines and associated terminal station equipment connecting one customer and a Non Utility Generator are assigned Common – customer 01. The transmission lines are functionalized 200 – Transmission and the terminal station equipment is functionalized 220 – Terminal Stations.

Transmission and Terminals Assignment Guideline #3 – All radial transmission lines and associated terminal station equipment connecting generation to the bulk grid are assigned Common – customer 01, and functionalized the same as the generator the equipment connects.

Transmission and Terminals Assignment Guideline #4 – All transmission and terminal station equipment that connects voltage support equipment which is of benefit to the previously assigned common high voltage transmission network is assigned Common – customer 01. The transmission line is functionalized 200 – Transmission and the terminal station equipment (i.e. voltage support equipment) is functionalized 220 – Terminal Stations.

Figure 2 provides an example of the application of Transmission and Terminals Assignment Guidelines #1 through #4.

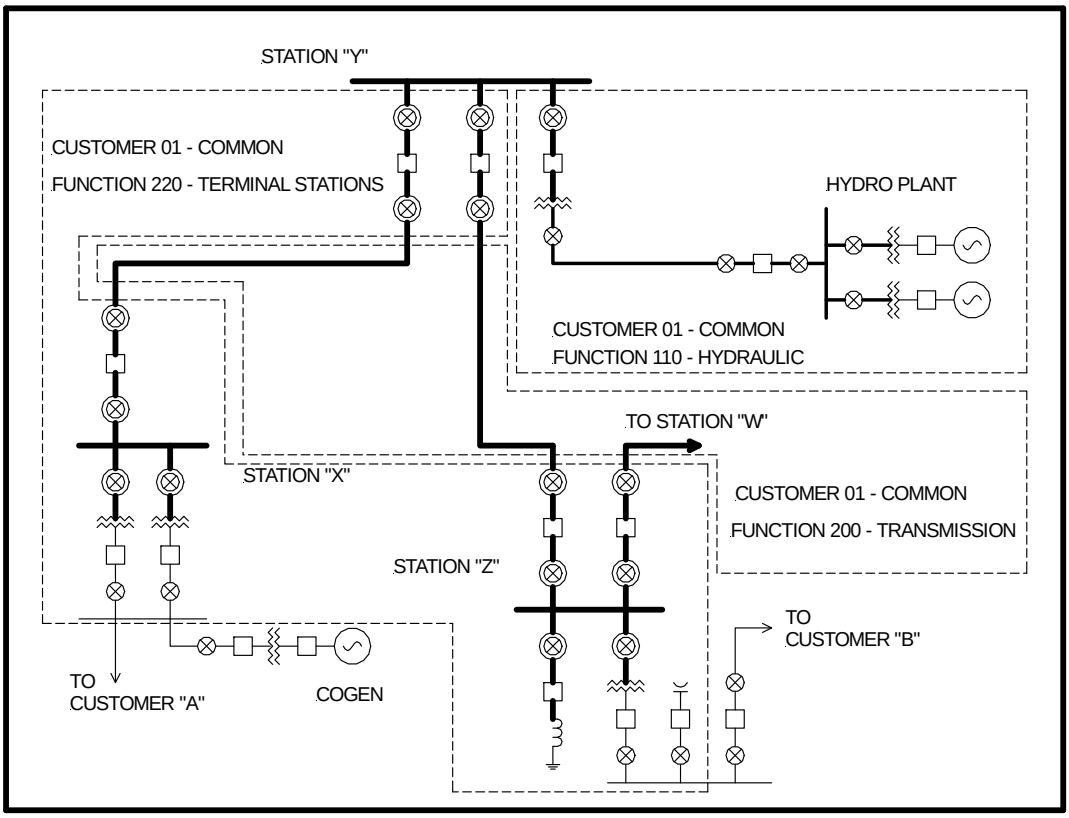

Figure 2

Beyond the common high voltage transmission network or backbone, a power system often contains medium voltage transmission loops between two or more stations on the high voltage network. Similar to ribs, which provide protection to vital organs, the loops provide reliable supply to customers through multi connections to the backbone.

Transmission and Terminals Assignment Guideline #5 – All 66 kV or 138 kV transmission and terminal station equipment that completes an underlying transmission loop between two points on the previously assigned Common high voltage transmission network and connects two customers (i.e. NP and Hydro Rural) is assigned Common – customer 01. The transmission line is functionalized 200 – Transmission and the terminal station equipment is functonalized 220 – Terminal Stations.

Transmission and Terminals Assignment Guideline #6 – All 66 kV or 138 kV transmission and terminal station equipment that completes an underlying transmission loop between two points on the previously assigned Common high

voltage transmission network and connects one customer (i.e. NP) is specifically assigned to that customer. The transmission line is functionalized 200 – Transmission and the terminal station equipment is functionalized 220 – Terminal Stations. In the case that the specifically assigned customer is Hydro Rural, the function is 210 – Sub-transmission – Hydro Rural.

Figure 3 provides an example of the application of Transmission and Terminals Guidelines #5 and #6.

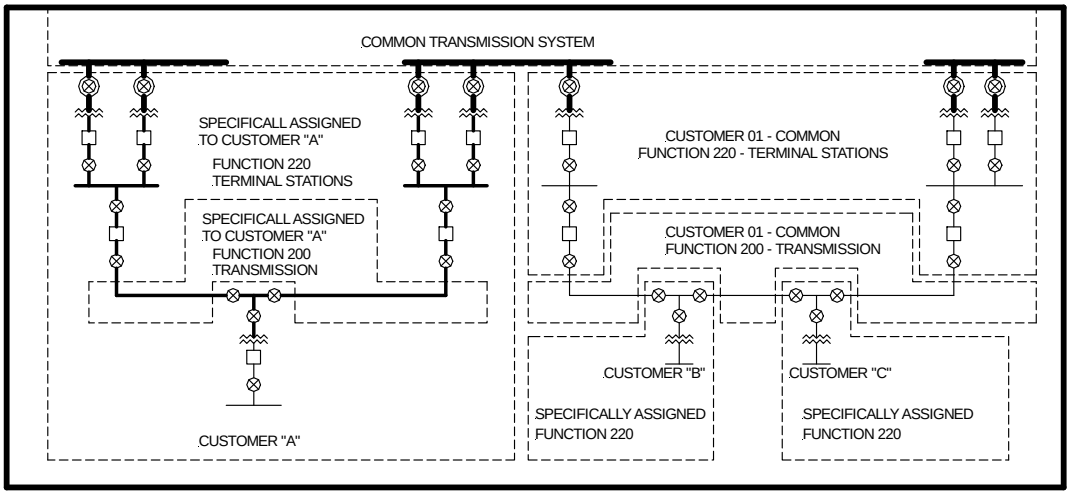

Figure 3

Transmission and Terminals Assignment Guideline #7 – All 66 kV or 138 kV transmission and terminal station equipment that completes an underlying transmission loop between two points on the previously assigned Common high voltage transmission network and connects one customer (i.e. NP) and generation is assigned Common – customer 01. The transmission line is functionalized 200 – Transmission and the terminal station equipment is functionalized 220 – Terminal Stations.

Figure 4 provides an example of the application of Transmission and Terminals Assignment Guideline #7.

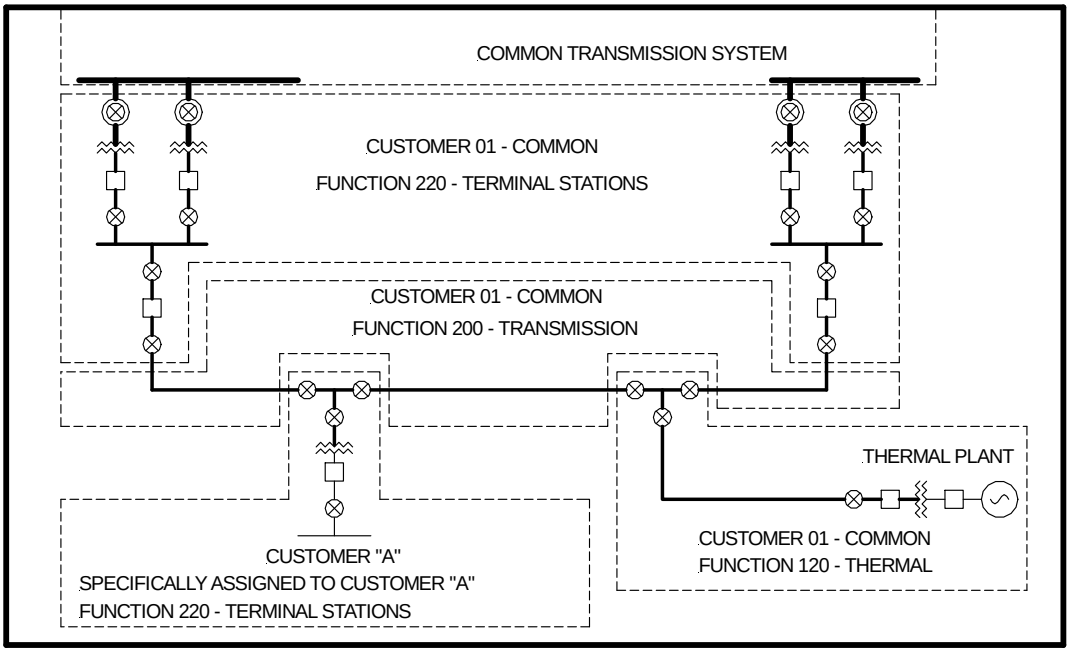

Figure 4

Extending from the common high voltage transmission network or backbone, a power system contains radial transmission systems. These radial transmission systems, resembling limbs, provide service to specific geographic regions or single customers.

Transmission and Terminals Assignment Guideline #8 – All radial 66 kV or 138 kV transmission and terminal station equipment that connects the previously assigned Common high voltage transmission network to two or more customers (i.e. NP and Hydro Rural) is assigned Common – customer 01. The transmission line is functionalized 200 – Transmission and the terminal station equipment is functionalized 220 – Terminal Stations.

Transmission and Terminals Assignment Guideline #9 – All radial 66 kV or 138 kV transmission and terminal station equipment that connects the previously assigned common high voltage transmission network to one customer is specifically assigned to that customer. The transmission line is functionalized 200 – Transmission and the terminal station equipment is functionalized 220 – Terminal Stations. If the specific customer is Hydro Rural – customer 03, then the transmission and terminal station equipment is functionalized 210 – Sub-transmission – Hydro Rural.

Transmission and Terminals Assignment Guideline #10 – All voltage support equipment installed on 66 kV or 138 kV radial transmission systems that are required for voltage control on the radial transmission system will be assigned and functionalized the same as the transmission system to which it is connected.

It is common practice on power systems to connect terminal stations to the 66 kV and/or 138 kV radial and looped transmission systems via a tee-tap. This tee-tap arrangement includes two disconnect switches (complete with ground switches) in the transmission line to create a high voltage bus segment and a third disconnect switch to connect a step down power transformer and low voltage equipment.

Transmission and Terminals Assignment Guideline #11 – All 66 kV or 138 kV terminal station equipment on looped or radial transmission systems that are used to establish a terminal station via tee-tapping to supply two or more customers will be assigned Common – customer 01, and functionalized 220 – Terminal Stations.

Transmission and Terminals Assignment Guideline #12 – All 66 kV or 138 kV terminal station equipment on looped or radial transmission systems that are used to establish a terminal station via tee-tapping to supply one customer will be specifically assigned to that customer, and functionalized 220 – Terminal Stations. If the specific customer is Hydro Rural – customer 03, then the equipment is functionalized 310 – Distribution Substations.

Figures 3 and 4 provide examples of the application of Transmission and Terminals Assignment Guidelines #11 and #12.

Impacts of Station Configuration on Assignment

Station configurations can impact upon the way equipment is assigned in multi customer/multi-function terminal stations. In a load bus (or single bus) arrangement there is one dedicated circuit breaker/switching device for each transmission line and power transformer. The arrangement clearly highlights that the circuit breaker/switch device should be assigned and functionalized the same as the equipment it controls. However, as the bus arrangement changes, so does the clarity on assignment. The addition of a low voltage circuit breaker/switching device between two previously independent and separate customer feeds in a station, will cause the change in assignment of assets from two groups of specifically assigned assets to a single group of common assets. The reason being that the normally open switching device on the low voltage side can be closed to supply both customers with one of the step down transformers out of service. Figure 5 highlights the change in assignment for these two conditions.

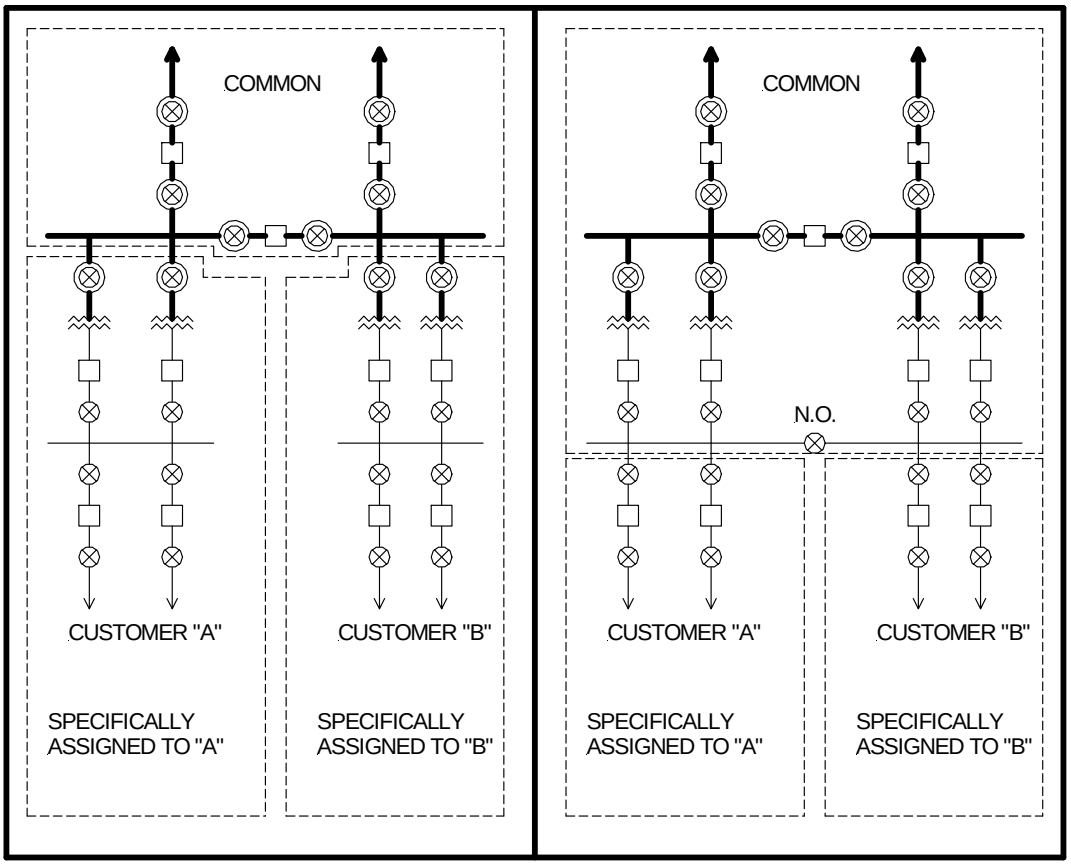

Figure 5

In a ring bus arrangement each circuit breaker is shared by the two elements connected to the ring on either side of the breaker. This lack of one-to-one correspondence between a circuit breaker and transmission line or transformer is of little consequence in single customer – single function terminal stations. However, in a multi-function station containing a ring bus arrangement, individual circuit breakers must be identified so that the appropriate function can be given to each. Clearly, if one new circuit breaker is added to a ring bus to facilitate the termination of a specifically assigned transmission line, then the new circuit breaker would be the asset selected to be specifically assigned. In instances where system changes result in the need to change the assignment of assets on a ring bus without capital dollars being incurred at the station, judgment is required to select the appropriate assets to reassign. In this case consideration should be given to selecting the asset(s) with the appropriate operating identification number(s) and/or age.

Assigning Distribution

NLH operates distribution systems in each of the five cost of service systems. Therefore it is important that assets be identified by the proper cost of service system code. The NLH distribution assets are used predominantly to service Hydro Rural customers and therefore the majority of NLH distribution assets will be assigned to customer 03. However, a limited number of NLH distribution class assets are used to supply station service power to generating stations, tank farms and water control structures on the Island Interconnected System. These distribution assets exist only to support the generating station and must be functionalized the same as the generating station they serve (i.e. 110 Hydraulic, 120 Thermal).

> ***Distribution Assignment Guideline #1 – All distribution plant used to supply station service power to generation stations, tank farms or water control structures on NLH interconnected systems are assigned to customer 01 – Common and are functionalized the same as the generating station they support.***

Many distribution systems contain a distribution substation, whose purpose it is to transform the distribution system voltage level from one level to another (i.e. 25 kV to 12.5 kV). The station will consist of a number of poles and pole hardware, which form a box structure, the power transformer(s) (i.e. either single phase, multiple single phase or three phase unit), fused disconnects for transformer protection, one or more distribution transformers to provide station service, lighting and the power transformer pad or platform, all within a fenced area. All of these assets, including the land clearly function as a distribution substation.

> ***Distribution Assignment Guideline #2 – All distribution assets in a substation used to change the distribution voltage from one level to another distribution voltage level (i.e. 12.5 kV to 4.16 kV) are functionalized 310 – Distribution Substations.***

Often the distribution substation will contain one or more reclosers and associated by-pass switches. These reclosers are protective devices, which trip their connected distribution line should a short circuit occur on the line, similar to circuit breakers in high voltage terminal stations. Unlike power circuit breakers distribution class reclosers may be located in a substation or mounted on a distribution pole without a station. While there there is no difference in the function of a recloser whether it is installed out on a distribution line or in a distribution substation protecting a distribution line, the location provides for two cost of service functions.

Distribution Assignment Guideline #3a – All distribution class reclosers and associated by-pass switches, located in a substation and used for distribution line protection are functionalized 310 – Distribution Substations.

Distribution Assignment Guideline #3b – All distribution class reclosers and associated by-pass switches, located on a distribution line and used for distribution line protection are functionalized 330 – Distribution Primary.

Depending upon the layout of the distribution system, a recloser station may be established to facilitate the installation of one or more reclosers. The function of the recloser(s) in a recloser station has not changed from that described above.

Distribution Assignment Guideline #4 – All plant used to establish a recloser station within a distribution system is functionalized 330 – Distribution Primary.

As a protective device, a recloser may be used to apply protection to a power transformer or a diesel generator. In these cases the recloser no longer functions as a primary voltage distribution device as described above.

Distribution Assignment Guideline #5 – All distribution class reclosers, located in a distribution substation, used for power transformer protection are functionalized 310 – Distribution Substations.

Distribution Assignment Guideline #6 – All distribution class reclosers, located in at a diesel plant, used for diesel generator protection are functionalized 125 – Diesel Generation.

The distribution class sectionalizer is another protective device used by NLH. For the purposes of the cost of service, sectionalizers will be assigned the same as reclosers.

Voltage regulation on NLH distribution systems is provided by distribution class voltage regulators. The voltage regulators used by NLH are single phase units, which are connected at the primary voltage level. The purpose of the voltage regulator is to maintain a near constant voltage level (within a prescribed band width) at a fixed point on the distribution system, which, in turn, ensures acceptable voltages to the customers on that portion of the system. Up to three voltage regulator banks may be installed on a single radial distribution feeder to provide acceptable voltages to all customers connected to the feeder. Most of NLH's voltage regulators are rated 14.4/7.2 kV, 200

Amp. However, there are a number of 100 Amp and 400 Amp voltage regulators in service. Voltage regulators are installed on a platform between two poles (in a three phase configuration) with a stub pole providing support for the center of the platform. For 100 Amp and 200 Amp installations the ground clearance is sufficient to avoid fencing the area. However, for 400 Amp installations, limited ground clearance requires that the installation be surrounded by a fence for public safety. The fencing of a 400 Amp installation gives the appearance of a voltage regulator station.

For the most part, the voltage regulator is considered a primary voltage component and as such is functionalized 330 - Distribution Primary. The one exception to this functionalization is for voltage regulators located in a terminal station on an interconnected system. On the interconnected systems NLH supplies the individual distribution systems via high voltage terminal stations. The terminal stations contain one or more three phase power transformers which step the voltage down from the transmission level (i.e. 66 kV and above) to the distribution primary voltage level (i.e. below 66 kV). Proper regulation of the voltage at the sending end of the distribution system (at the terminal station) can be accomplished in a number of ways. First, the power transformer(s) at the terminal station can be equipped with an on load tap changer (OLTC) to regulate the distribution bus voltage. This is the case at Happy Valley Terminal Station and St. Anthony Diesel Plant Terminal Station. Alternatively, the power transformer(s) at the terminal station is equipped with an off load tap changer (i.e. fixed tap) and a set of distribution class voltage regulators are installed between the power transformer and the distribution bus to provided the necessary voltage regulation. Each arrangement has its advantages and disadvantages. The majority of NLH terminal station arrangements include the application of voltage regulators on the low voltage side of the power transformer. The voltage regulators in this arrangement provide the same function as the OLTC, which is an integral part of the power transformer. Therefore, the distribution class voltage regulators located on the low voltage side of a power transformer(s) in a terminal station would be functionalized the same as the power transformer – 310 – Distribution Substation.

Distribution Assignment Guideline #7 – All distribution class voltage regulators, platforms and associated by-pass switches, located on the low voltage side of a power transformer(s) in a terminal station, used for voltage regulation of a terminal station distribution bus are functionalized 310 – Distribution Substation.

Distribution Assignment Guideline #8 – All distribution class voltage regulators, platforms and associated by-pass switches, including voltage regulator station,

located on a distribution system outside a terminal station are functionalized 330 – Distribution Primary.

Beyond voltage regulators, reclosers and sectionalizers, a distribution system consists of many assets. Guidelines for the assignment of the remaining distribution plant are as follows:

Distribution Assignment Guideline #9 - All Submarine cables operating at voltages between 4.16 kV and 46 kV three phase are functionalized 320 – Submarine Cables.

Distribution Assignment Guideline #10 – All distribution assets including: conductors, gang operated disconnect switches, disconnect switches, platforms and shunt capacitor banks operating at distribution system primary voltages (i.e. between 4.16 kV and 46 kV three phase) are functionalized 330 – Distribution Primary.

Distribution Assignment Guideline #11 – All pole mounted and pad mounted single phase and three phase transformer banks used to convert voltage from the primary voltage level to a customer service voltage (i.e. less than 1 kV) are functionalized 340 – Distribution Transformers.

Distribution Assignment Guideline #12 – All conductor between the distribution transformer and the individual customer service drops is functionalized 350 – Distribution Secondary.

Distribution Assignment Guideline #13 – All Hydro Rural Customer meters are functionalized 360 – Distribution Meters.

Distribution Assignment Guideline #14 – All conductor from the distribution secondary to the individual customer service entrances (i.e. triplex) is functionalized 370 – Distribution Services.

Distribution Assignment Guideline #15 – All streetlights and their components including photo cells, luminaries and arms are functionalized 380 – Distribution Streetlights.

Distribution Assignment Guideline #16 – All distribution poles, and pole hardware (including nuts, bolts, cross arms, insulators, braces, etc) are functionalized 390 – Distribution Poles and Pole Hardware.

Distribution Assignment Guideline #17 – All land, land improvements and right of ways associated with the operation of a distribution system are functionalized 395 – Land and Land Improvements.

General Plant

Beyond the assets associated directly with the generation, transmission and distribution of electricity, NLH has a number of assets that provide a supporting role in the daily operation of the organization. These "non-current carrying" assets often have multi functions. For an example, a line truck may typically only be used for distribution, but it can be used to support both transmission and distribution functions. The assets that cannot be functionalized as either generation, transmission or distribution based upon the preceding guidelines fall into the function of general plant. It is common practice within cost of service methodologies across the industry to group assets in a general plant function and assigned those costs to all customers of the system. The NLH COS uses customer code 98 – General Plant in addition to function 800 – General Plant to ensure proper assignment of general plant costs.

NLH owns and maintains a variety of buildings throughout its service territory. It is reasonable to functionalize control buildings in terminal stations to 220 – Terminal Stations for the control building only exists because of the terminal station. Similarly, it is reasonable to functionalize powerhouses the same as the generating equipment they contain (i.e. hydraulic, thermal, diesel). The problem comes in assigning office buildings, line depots and warehouses that play a supporting role to multiple functions. Clearly, office buildings, line depots and warehouses fall into the general plant category, and as such, are functionalized 800 – General Plant, customer 98 – General Plant. The important COS code then becomes the system code. For example, the corporate head office, Hydro Place, supports all systems. As a result, Hydro Place would have a COS system of ASG – All Systems General Plant. However, the Energy Control Center within Hydro Place provides the operational support to the Island Interconnected System only and therefore would be given the COS system code INT.

General Plant Assignment Guideline #1 – All fixed assets located at Hydro Place (including furniture, computer hardware, computer software, etc), except the Energy Control Centre, are placed in system ASG – All System General Plant, assigned to customer 98 – General Plant and functionalized 800 – General Plant.

General Plant Assignment Guideline #2 – All computer hardware and software located within the Energy Control Centre at Hydro Place necessary for operation of

the Energy Management System are placed in system INT – Island Interconnected, assigned to customer 98 – General Plant and functionalized 800 – General Plant.

General Plant Assignment Guideline #3 – All regional and area offices and their contents on the Island of Newfoundland are placed in system INT – Island Interconnected, assigned to customer 98 – General Plant and functionalized 800 – General Plant.

General Plant Assignment Guideline #4 – All regional and area offices and their contents in Labrador are placed in system LIN - Labrador Interconnected, assigned to customer 98 – General Plant and functionalized 800 – General Plant.

General Plant Assignment Guideline #5 – All line depots and their contents are placed in system that they support, are assigned to customer 98 – General Plant and functionalized 800 – General Plant.

General Plant Assignment Guideline #6 – All warehouses and their contents are placed in system that they support, are assigned to customer 98 – General Plant and functionalized 800 – General Plant.

NLH operates and maintains a fleet of a wide variety of vehicles in order to operate and maintain its electrical systems. Given the mobile nature of vehicles, and their ability for use across systems and traditional generation, transmission and distribution functions, all NLH vehicles fall into the general plant function. Care is required in assigning the COS system code for vehicles. Within JDE the asset master records for vehicles are set up such that the location code for a specific vehicle represents the area or regional office responsible for the vehicle. In essence the office that originates the "work" using the vehicle. This approach is taken to assist the maintenance planners in preparing the day-to-day maintenance work schedules. However, the physical location of the vehicle may be different than the JDE asset master location code. To keep track of the physical location, the Transportation Asset Manager places the physical location of the vehicle in the remarks section of the JDE asset master record. For example, the JDE asset master records will indicate that a heavy duty line truck (i.e. V4488) has a location code of STAOFFICE. In other words, the St. Anthony Area Office is the office responsible for the

vehicle. However, the remarks section of the asset master record indicates that the truck is physically located in L'Anse Au Loup. Therefore, the COS system code would be LAL – L'Anse Au Loup and not INT – Island Interconnected.

General Plant Assignment Guideline #7 – All vehicles (including line trucks, boom trucks, stake body trucks, pick ups, vans, ATV's, snowmobiles, nodwells, gotracks, etc) are assigned to customer 98 – General Plant and functionalized 800 – General Plant. The physical location of the vehicle as outlined in the remarks section of the JDE asset master record will determine the system.

Historically power systems employed telecontrol equipment to provide communications between stations (generating, terminal station) and a control center for monitoring and control of the power system. As a result, the telecontrol equipment provided a very specific and well defined function. However, with advances in technology, telecontrol equipment has become multifunctional in its application. Modern telecontrol equipment not only provides monitoring and control of the power system elements, but also voice, data etc. As a result telecontrol equipment now falls under the function of general plant.

General Plant Assignment Guideline #8 – All Telecontrol equipment including RTU's, microwave sites, VHF radios and towers and communication switches are placed in system that they serve, are assigned to customer 98 – General Plant and functionalized 800 – General Plant.

Transmission Line Assignment – Quick Reference						
TL	KV	From	To	Assignment	Function	Comments
201	230	Western Avalon	Hardwoods	Common	Transmission	Bulk Grid
202	230	Bay D'Espoir	Sunnyside	Common	Transmission	Bulk Grid
203	230	Western Avalon	Sunnyside	Common	Transmission	Bulk Grid
204	230	Bay D'Espoir	Stony Brook	Common	Transmission	Bulk Grid
205	230	Stony Brook	Buchans	Common	Transmission	Bulk Grid
206	230	Bay D'Espoir	Sunnyside	Common	Transmission	Bulk Grid
207	230	Sunnyside	Come By Chance	Common	Transmission	Bulk Grid
208	230	Western Avalon	Vosieys Bay Nickel	Vale	Transmission	Vale Only
209	230	Stephenville	Bottom Brook	Common	Transmission	Bulk Grid
210	138	Stony Brook	Cobb's Pond	Common	Transmission	138 kV Loop – NLH + NP
211	230	Massey Drive	Bottom Brook	Common	Transmission	Bulk Grid
212	138	Sunnyside	Linton Lake	Common	Transmission	138 kV – NP + NLH + Gen
214	138	Doyles	Bottom Brook	NP	Transmission	NP Only
215	66	Doyles	Grand Bay	NP	Transmission	NP Only
217	230	Western Avalon	Holyrood	Common	Transmission	Bulk Grid
218	230	Holyrood	Oxen Pond	Common	Transmission	Bulk Grid
219	138	Sunnyside	Salt Pond	NP	Transmission	NP Only
220	69	Bay D'Espoir	Barachoix	Hydro Rural	Sub-transmission	Hydro Rural Only
221	66	Peter's Barren	Hawke's Bay	Hydro Rural	Sub-transmission	Hydro Rural Only
222	138	Stony Brook	Springdale	Common	Transmission	138 kV Loop – NLH + NP
223	138	Springdale	Indian River	Common	Transmission	138 kV Loop – NLH + NP
224	138	Howley	Indian River	Common	Transmission	138 kV Loop – NLH + NP
225	66	Deer Lake Power	Deer Lake	Common	Transmission	Tie to DLP + NP local load
226	66	Deer Lake	Berry Hill	Hydro Rural	Sub-transmission	Hydro Rural Only
227	66	Berry Hill	Daniels Harbour	Hydro Rural	Sub-transmission	Hydro Rural Only
228	230	Buchans	Massey Drive	Common	Transmission	Bulk Grid
229	66	Wiltondale	Glenburnie	Hydro Rural	Sub-transmission	Hydro Rural Only
231	230	Bay D'Espoir	Stony Brook	Common	Transmission	Bulk Grid
232	230	Stony Brook	Buchans	Common	Transmission	Bulk Grid
233	230	Buchans	Bottom Brook	Common	Transmission	Bulk Grid
234	230	Upper Salmon	Bay D'Espoir	Common	Hydraulic Gen	Connects USL and GCL
235	230	Stony Brook	Grand Falls Freq. Con.	Common	Transmission	ACCC GLF + Exploits
237	230	Western Avalon	Come By Chance	Common	Transmission	Bulk Grid
238	230	Stephenville	ACCC SVL	ACCC SVL	Transmission	ACCC SVL mill only
239	138	Deer Lake	Berry Hill	Hydro Rural	Sub-transmission	Hydro Rural Only
241	138	Peter's Barren	Plum Point	Hydro Rural	Sub-transmission	Hydro Rural Only
242	230	Holyrood	Hardwoods	Common	Transmission	Bulk Grid
243	138	Hinds Lake	Howley	Common	Hydraulic Gen	Connects HLK to grid
244	138	Plum Point	Bear Cove	Hydro Rural	Sub-transmission	Hydro Rural Only
245	138	Deer Lake	Howley	Common	Transmission	138 kV Loop – NLH + NP
246	69	South Brook	Robert's Arm	Hydro Rural	Sub-transmission	Hydro Rural Only
247	230	Cat Arm	Deer Lake	Common	Hydraulic Gen	Connects Cat Arm to grid
248	230	Massey Drive	Deer Lake	Common	Hydraulic Gen	Connects Cat Arm to grid
250	138	Bottom Brook	Grandy Brook	Hydro Rural	Sub-transmission	Hydro Rural Only
251	69	Howley	Hampden	Common	Transmission	Connects Cat Arm Stn Serv + Rattle Brook + Hydro Rural
252	69	Hampden Tap	Jacksons Arm	Common	Transmission	Connects Cat Arm Stn Ser + Rattle Brook + Hydro Rural

Transmission Line Assignment – Quick Reference (continued)						
TL	KV	From	To	Assignment	Function	Comments
253	69	Jackson's Arm Tap	Coney Arm	Common	Transmission	Connects Cat Arm Stn Ser + rattle Brook
254	66	Boyd's Cove	Farewell Head	Hydro Rural	Sub-transmission	Hydro Rural Only
255	25	Grandy Brook	Grand Briut	Hydro Rural	Distribution	Hydro Rural Only
256	138	Bear Cove	St. Anthony Airport	Hydro Rural	Sub-transmission	Hydro Rural Only
257	69	St. Anthony Airport	Roddickton Thermal	Hydro Rural	Sub-transmission	Hydro Rural Only
258	25	Monkstown	Paradise River	Common	Hydraulic Gen	Connects PRV to grid
259	138	Berry Hill	Peter's Barren	Hydro Rural	Sub-transmission	Hydro Rural Only
260	138	Seal Cove Road	Bottom Waters	Hydro Rural	Sub-transmission	Hydro Rural Only
261	69	St. Anthony Airport	St. Anthony Diesel Plant	Hydro Rural	Sub-transmission	Hydro Rural Only
262	66	Peters Barren	Daniels Harbour	Hydro Rural	Sub-transmission	Hydro Rural Only
263	230	Granite Canal	Upper Salmon	Common	Hydraulic Gen	Connects GCL to grid
264	66	Buchans	Duck Pond	Aur	Transmission	Aur Resources Only

Terminal Station Assignment – Quick Reference

Location Code	Station Name	Customer	Function	Comments
BCXTS	Barachoix	Hydro Rural	Dist Substation	Connects HR only
BDETS1	Bay D'Espoir	Common Common Hydro Rural	Hydraulic Gen. Terminal Stations Sub-transmission	Connects BDE Plant 230/69 kV & 69/24 kV Connects stn ser & HR TL220 Line Term.
BLATS	Bay L'Argent	Nfld Power	Terminal Stations	One Customer
BCVTS	Bear Cove	Hydro Rural	Sub-transmission Dist Substation	138 kV beakers & reactor 138/12.5 kV
BHLTS	Berry Hill	Hydro Rural	Sub-transmission	138/66 kV station
BBKTS	Bottom Brook	Common Nfld Power Hydro Rural	Terminal Stations Terminal Stations Sub-transmission	NP + Hydro Rural T2 + TL214 wave trap TL250 wave trap
BWTTS	Bottom Waters	Hydro Rural	Dist Substation	Connects HR only
BUCTS	Buchans	Common Common exclude O&M	Terminal Stations Terminal Stations	NUG + NP TL280 line term.
CATTS	Cat Arm	Common	Hydraulic Gen.	Connects CAT Plant
CBCTS	Come By Chance	Common North Atlantic Refinery	Terminal Stations Terminal Stations	230 kV bus + breaker T1 & T2 only NARL
CAMTS	Coney Arm	Common	Hydraulic Gen.	CAT alt Stn Service
CRVTS	Conne River	Hydro Rural	Dist Substation	Connects only HR
CBFTS	Corner Brook Freq Converter	CBP&P	Terminal Stations	Connects Only CBP&P
CHDTS	Cow Head	Hydro Rural	Sub-transmission Dist Substation	66 kV Line Breaker 66/12.5 kV
DHRTS	Daniels Harbour	Hydro Rural	Sub-transmission Dist Substation	66 kV Line Breaker 66/12.5 kV
DLKTS	Deer Lake	Common Common	Hydraulic Gen. Terminal Stations	230 kV Line Terms. 230/138 kV, 138/66 kV NP + Hydro Rural
DLSTS	Doyles	Nfld Power	Terminal Stations	Connects Only NP
DPDTS	Duck Pond	Aur Resources	Terminal Station	Connects Only Aur
EHWTS	English Harbour West	Hydro Rural Hydro Rural	Sub-transmission Dist Substation	Line Disc switch L20-1 69/25 kV - HR
FHDTS	Farewell Head	Hydro Rural	Dist Substation	Connects only HR
GLBTS	Glenburnie	Hydro Rural	Dist Substation	Connects only HR
GWDTS	Glenwood	Nfld Power	Terminal Stations	NP Metering
GBYTS	Grand Bay	Nfld Power	Terminal Stations	Connects Only NP
GBKTS	Grandy Brook	Hydro Rural	Dist Substation	Connects Only HR
GFCTS	Grand Falls Frequency Converter	Common	Terminal Stations	NUG + ACC GFL
GCLTS	Granite Canal	Common	Hydraulic Gen.	Connects GCL Plant
HDNTS	Hampden	Hydro Rural	Dist Substation	Connects Only HR
HDNTAPTS	Hampden Tap	Hydro Rural	Sub-transmission	66 kV to HDNTS
HWDTS	Hardwoods	Common Common	Terminal Stations Gas Turbine	Bulk Grid B7T5-1 to G1
HBYTS	Hawkes Bay	Common Hydro Rural Hydro Rural	Diesel Sub-transmission Dist Substation	B3T3-1 to G1 & G2 66/12.5 kV 12.5 kV Line Terms
HLKTS	Hinds Lake	Common	Hydraulic Gen.	Connects HLK Plant
HRDTS	Holyrood	Common Common Nfld Power	Thermal Gen. Terminal Stations Terminal Stations	Connects HRD Plant 230/69 kV NP + stn 230/138 kV
HLYTS	Howley	Common Common	Terminal Stations Hydraulic Gen.	NP + Gen TL243 Line Term
IRVTS	Indian River	Common	Terminal Stations	NP + Hydro Rural
JAMTS	Jacksons Arm	Hydro Rural	Dist Substation	Connects Only HR
JAMTAPTS	Jacksons Arm Tap	Hydro Rural	Sub-transmission	69 kV to JAM

Terminal Station Assignment – Quick Reference (continued)				
Location Code	Station Name	Customer	Function	Comments
LHRTS	Long Harbour			Removed From Service
LLKTS	Linton Lake	Nfld Power	Terminal Stations	Metering
MBKTS	Main Brook	Hydro Rural	Dist Substation	One customer
MDRTS	Massey Drive	Common Common Nfld Power CBP&P	Hydraulic Gen. Terminal Stations Terminal Stations Terminal Stations	TL248 line term Bulk grid 2 customer Metering + 66 kV Disc Metering
MKSTS	Monkstown	Common Common X O&M Nfld Power	Terminal Stations Terminal Stations Terminal Stations	PRV + NP NP trf change, TL258 Metering
OPDTS	Oxen Pond	Common Nfld Power	Terminal Stations Terminal Stations	Bulk grid Metering
PBNTS	Peter's Barren	Hydro Rural	Sub-transmission	138/66 kV
PPDTS	Parson's Pond	Hydro Rural	Dist Substation	Connects Only HR
PPTTS	Plum Point	Hydro Rural Hydro Rural	Sub-transmission Dist Substation	138 kV lines + reactors 138/12.5 kV
PRVTS	Paradise River	Common	Hydraulic	Connects Generation
RHRTS	Rocky Harbour	Hydro Rural	Dist Substation	Connects Only HR
RBKTS	Rattle Brook	Common	Hydraulic Gen.	NUG + CAT stn ser
SCVTS	Sally's Cove	Hydro Rural	Dist Substation	Connects Only HR
SDPTS	St. Anthony Diesel Plant	Common Hydro Rural Hydro Rural	Diesel Gen. Sub-transmission Dist Substation	Diesels + T2 TL261, T1, B1T1 25 kV feeders
SOKTS	South Brook	Hydro Rural	Dist Substation	Connects Only HR
SPLTS	Springdale	Common Nfld Power	Terminal Stations Terminal Stations	NP + Hydro Rural Metering
SSDTS	Sunnyside	Common Nfld Power	Terminal Stations Terminal Stations	Bulk grid TL219 line term
STATS	St. Anthony Airport	Hydro Rural	Sub-Transmission	138 kV and 69 kV
STBTS	Stony Brook	Common Nfld Power Abitibi GFL	Terminal Stations Terminal Stations Terminal Stations	Bulk grid Metering Metering
SVLTS	Stephenville	Common Common Nfld Power Abitibi SVL	Gas Turbine Terminal Stations Terminal Stations Terminal Stations	Gas turb + T1, GT1 T3 and TL209 B2L405, L405T4 TL238, B1L38, L09L38
SVLABITIBI	Abitibi Stephenville	Abitibi Stephenville	Terminal Stations	Metering equipment
USLTS	Upper Salmon	Common	Hydraulic	Connects USL & GCL
VBNTS	Vosieys Bay Nickel	Vale	Terminal Stations	Connects Only Vale
WAVTS	Western Avalon	Common Nfld Power	Terminal Stations Terminal Stations	230 kV line term. 138 kV and 66 kV trf
WDLTS	Wiltondale	Hydro Rural Hydro Rural	Sub-Transmission Dist. Substation	TL229 line term 66/12.5 kV

Distribution Abbreviation Quick Reference			
Abbr	System Name	Abbr	System Name
DSLGEN	Diesel Plant	CFC	Coffee Cv
RCLSTN	Recloser Station	CHD	Cow Head
SUBSTN	Substation	CHT	Charlottown
ANP	Anchor Point	CIS	Change Islands
BAB	Bakers Brook	CMC	Coomb's Cove
BAH	Barrd Harbour	CNO	Cape Norman
BAI	Barrd Island	COC	Coachman s Cv
BCN	Bear Cv North	COH	Cooks Harbour
BCS	Bear Cv South	CON	Conche
BCV	Bear Cove	CPO	Cape Onion
BCX	Barachoix	CRQ	Croque
BDC	Black Duck Cv	CRR	Castors River
BDE	Bay D Espoir	CRV	Conne River
BED	Beachside	CTW	Cartwright
BES	Beaches	CUZ	Curzon
BGB	Brig Bay	DAC	Dawson s Cv
BHC	Burnt Head Cv	DAV	Davis Inlet
BHL	Berry Hill	DEB	Deep Bay
BIA	Bide Arm	DEC	Deadman s Cv.
BIB	Big Brook	DHR	Daniels Hr.
BIC	Bird Cv	DOC	Dock Cv
BIF	Bishop s Falls	DOM	Domino
BIH	Birchy Head	EAB	Eastern Brook
BKT	Black Tickle	ECW	Eddies Cove West
BLB	Belburns	EDC	Eddies Cv
BLC	Blue Cv	EHW	English Hr. West
BLP	Belldowns Point	ENG	Englee
BMN	Beaumont North	ENP	English Point
BMS	Beaumont South	FDL	Fleur De Lys
BMT	Beaumont	FGO	Fogo
BOX	Boxey	FHD	Farewell Head
BRC	Brents Cv	FLC	Flowers Cv
BRH	Bartletts Harbour	FOA	Fortune Arm
BRM	Belloram	FOP	Forresters Point
BRT	Brighton	FRC	Frankies Cv
BSD	Bayside	FRS	Francois
BTH	Boat Harbour	FRU	Forteau
BTK	Black Tickle	FXC	Fox Cv
BUL	Burlington	GAU	Gaultois
BUR	Burgeo	GBH	Great Brehat
BWT	Bottom Waters	GBK	Grandy Brook
CAB	Camp Boggy	GBU	Grand Bruit
CAI	Capstan Island	GDH	Godfathers Cv
CAM	Coney Arm	GIB	Green Island Bk.
CBA	Cape Bauld	GIC	Green Island Cv.

Distribution Abbreviation Quick Reference			
Abbr	System Name	Abbr	System Name
GLB	Glenburnie	LSD	Little Seldom
GOC	Goose Cv	LWC	Lower Cv
GQT	GQT	MAK	Makkovik
GRO	Grole	MBK	Main Brook
GRP	Green Point	MCC	McCallum
GRS	Grandois	MDL	Mud Lake
GUC	Gunners Cv	MFA	Muskrat Falls
GYR	Grey River	MIA	Middle Arm
HAB	Hare Bay	MIB	Ming s Bight
HAH	Harry s Harbour	MIC	Miles Cv1
HAW	Hayward s Cv	MKS	Monkstown
HAY	Hay Cv	MLT	Milltown
HBR	Harbour Breton	MOA	Mose Ambrose
HBY	Hawkes Bay	MRV	Morrisville
HDE	Harbour Deep	MSH	Marys Hr.
HDN	Hampden	MSM	Mt. St. Margaret
HEB	Head of Bay d' Espoir	NAC	Nameless Cv
HPD	Hopedale	NAN	Nain
HRL	Harrie Lake	NAT	Natuashish
HRD	Holyrood	NEF	NEF New Ferrole
HRO	Harbour Round	NHR	NHR Neddy Harb
HTG	Hermitage	NIH	Nippers Harbour
HVY	Happy Valley	NNC	Nickeys Nose Cv
ISH	Island Harbour	NOD	Noddy Bay
JAC	Jacksons Cv	NOB	Norman Bay
JAM	Jacksons Arm	NOP	Norris Point
JBA	Joe Batts Arm	NWR	North West River
KGH	Kings Harbour	PAC	Port Au Choix
KGP	Kings Point	PAH	Paynes Hr.
KOA/KOB	Kona Beach	PAI	Pass Island
LAA	L'Anse Amour	PAQ	Pacquet
LAC	L'Anse Au Clair	PDC	Pond Cv
LAD	L'Anse Au Diable	PDR	Paradise River
LAL	Lanse Au Loup	PEF	Petit Forte
LAM	L'Anse Au Meadows	PET	Petites
LAP	La Poile	PGC	Pigeon Cv
LAS	La Scie	PHS	Port Hope Simpson
LBC	Labrador City	PIA	Pinsent's Arm
LBI	Little Bay Is.	PIW	Pinware
LBY	Little Bay	PLD	Portland Creek
LGC	Langdon Cv	PLI	Pilley s Island
LIB	Lushes Bight	PNC	Pines Cv
LOB	Lodge Bay	POA	Port Anson
LOC	Lobster Cv	POC	Pool s Cv
LOI	Long Island	POP	Pollards Point

Distribution Abbreviation Quick Reference			
Abbr	System Name	Abbr	System Name
POR	Point Rich	SHO	Shoal Cv East
POS	Port Saunders	SID	Silverdale
POV	Postville	SJA	St. Jacques
PPD	Parsons Pond	SJC	St. Joseph's Cv
PST	Pistolet Bay	SJU	St. Julinans
PPT	Plum Point	SLE	St. Lewis
PRB	Paradise River	SLU	St. Luinaire
PRV	Paradise River	SMH	Smith s Harbour
PUC	Purbeck s Cv	SOA	Sops Arm
QUP	Quirpon	SOK	South Brook
RAB	Rattling Brk	SPC	Ship Cv
RAL	Raleigh	SPK	St. Patricks
RAM	Ramea	SPL	Springdale
RAR	Roberts Arm	SPS	St. Pauls
RCE	Rencontre East	STA	ST Anthony Airport
REB	Red Bay	STH	Stag Harbour
REH	Reef s Harbour	STV	Straitsview
RHC	Rocky Harbour Cv	SVE	St. Veronicas
RHR	Rocky Harbour	SWC	South W. Crouse
RIG	Rigolet	SYC	Shalloway Cv
ROH	Round Harbour	TIC	Tilt Cv
ROM	Rooms	TIL	Tilting
ROP	River Of Ponds	TMR	Three Mile Rock
RWC	Roddickton	TRR	Trout River
SAB	St. Anthony Bight	TRT	Triton
SAL	St. Albans	VBT	Venams Bight
SAM	Snook s Arm	WDL	Wiltondale
SAV	Sandyville	WEP	Westport
SBA	St. Barbe	WHR	Williams Hr
SBK	Shoal Brook	WIB	Wild Bight
SBN	St. Brendans	WIC	Wick s Cv
SBY	Shoal Bay	WOO	Woodstock
SCA	St. Carols	WOP	Woody Point
SCB	Seldom Come By	WRC	Wreck Cove
SCC	Schooner Cv	WRV	Walsh's River
SCF	Sandy Cv (Fogo)	WSM	West St. Modeste
SCR	Savage Cv	WTB	Winterhouse Brook
SCV	Sallys Cv	WAB	Wabush
SDM	Seldom		
SDP	St Anthony Diesel Plant		
SEB	South East Bight		
SGC	Swanger s Cv		
SGE	St. Genevive		
SHC	Shoe Cv		
SHE	Sheshatshit		

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On page 43, the Board stated:

> *"It is a fair presumption that Hydro developed hydraulic sites because they offered capacity and energy at least cost, and that where such sites were remote from the transmission system, the cost of transmission between the site and the grid was included in the economic evaluation. Under such circumstances it is the Board's opinion that the transmission from site to grid should be classified in accordance with the generation itself."*

The Board's 1993 Cost of Service Report also states:

> *In the Board's opinion all lines, terminal stations and ancillary equipment dedicated to the service of a generating station should be classified in conformity therewith.*
>
> *Recommendation 15:*
> *That transmission lines and substations in the Island Interconnected System used solely or dominantly for the purpose of connecting remotely-located generation to the main transmission system be classified in the same manner as the generating stations they serve.*
>
> *Recommendation 16:*
> *That all other transmission be classified 100% to demand.*

It is Hydro's view that the Muskrat Falls generation is remote from the Island Interconnected System and the LIL and the LTA transmission assets were constructed to enable delivery of the Muskrat Fall generation energy to the Island grid.

In the 1993 Cost of Service Report, the Board did not explicitly state the approach for functionalization of transmission connecting remotely-located generation to the main transmission system. However, the practice employed in applying the cost of service methodology since its implementation in Hydro's "2001 General Rate Application" has been to functionalize and classify radial transmission assets connecting generation to the bulk grid in the same manner as the generation the transmission assets connect. Hydro's system planning guideline for assignment of plant for cost of service is provided in Attachment 1 to PUB-NLH-034. These guidelines were prepared to contribute to the consistent application of the requirements of the cost of service methodology in plant assignments.

The Transmission and Terminals Assignment Guideline #3, on page 15 of Attachment 1, states: "All radial transmission lines and associated terminal station equipment connecting generation to the bulk grid are assigned Common – customer 01, and functionalized the same as the generator the equipment connects."

With respect to the recommendation for the classification of the LIL as 100% demand-related, Brattle states that "The underlying cost characteristics of the LIL are such that the main cost driver of the LIL is demand, the transmission costs do not change with changes in production (other than production losses)." The Brattle recommendation does not acknowledge the fact that, by far, the main drivers of the LIL cost is the fact that the LIL is connecting remote generation to the Alternating Current grid of the Island Interconnected System. Indeed, the LIL is a 1,100 km transmission line. Brattle is not proposing to classify the LIL on a consistent basis with Brattle's proposed classification of Muskrat Falls generation.

Brattle also recommended that the LTA be functionalized as transmission and classified as 100% demand. The support for the recommendation appears to be common cost of service practice. This recommendation does not give consideration

for the purpose of the LTA, which connects the Muskrat Falls Generating Station to the Churchill Falls Generating Station. The purpose of the LTA relates to maximizing generation output to transfer over the LIL to the Island. Brattle has not proposed to classify the LTA on a consistent basis with Brattle's proposed classification of Muskrat Falls generation.

The Muskrat Falls Generating Station, the LIL and the LTA comprise the Muskrat Falls Project. It is an integrated project, where each facility element (i.e., Muskrat Falls, LIL, and LTA) contributes to the result of lifetime fuel cost savings. The primary purpose of the Muskrat Falls Project was to replace the Holyrood Thermal Generating Station on the Island Interconnected System and displace the requirement for thermal generation to supply customers' base load energy requirements. Hydro believes its recommendation to functionalize the Muskrat Falls Project, including all facility elements, as a single generation project is consistent with cost causation.

b) Christensen Associates Energy Consulting's Response.

CA Energy Consulting does not agree with Brattle's recommendation with respect to the functionalization of high voltage direct current ("HVDC") facilities as transmission, where such facilities provide power flows from the Muskrat Falls facilities in Labrador to Hydro's Island Interconnected System ("IIS"). The Brattle report argues that 1) the generation function stops at the low voltage side of a step-up transformer; and 2) that inclusion of asset costs in an OATT mandates the functionalization of HVDC as transmission.

Hydro's regulatory history, encompassing a 1993 cost of service methodology review that includes transmission classification methods,[2] and an internal System Planning Guideline document[3] establish a record of practice with respect to generator leads which is unequivocal in functionalizing lines such as the LIL and the LTA as generation and classifying them in the same manner as the generator that they serve.

Hydro's and industry practice support the validity of this approach. First, we note that the inclusion of HVDC costs within Hydro's OATT is a temporary provision, and applies only with respect to operating costs. Second, Hydro's HVDC facilities exist only because of a specific generation facility. Neither the LIL, connecting Muskrat Falls ("MF") to the IIS nor the LTA, connecting MF to Churchill Falls, would be in place absent MF. Third, the new HVDC lines are highly integrated with and inseparable from MF. Fourth, power will flow on the LIL exclusively from north to south, and largely follows the power supply pattern of MF, noting that the total flow capability of the LIL as a matter of design (900 MW) is closely matched to that of MF (824 MW), while the LTA is sized to handle MF load management traffic, suggesting that the facilities were jointly planned and designed as a common facility. Fifth, the existence of the LIL and LTA is driven by energy and associated fuel cost savings, as planned: fuel costs, not capacity, are highly specific to location—in the immediate case, the unique physical features and properties of MF beget fuel cost savings, in service of the IIS, mainly the customers and load of the Avalon Peninsula. If it were just capacity that had been needed, Hydro would, as a matter of least cost, have built/installed capacity in close proximity to the loads to be served. Finally, we can think of several utilities and regions that have built transmission facilities that have corresponded with generation interconnection

[2] Please see the following Board document: *"A Referral By Newfoundland and Labrador Hydro for The Proposed Cost of Service Methodology and a Proposed Method for Adjusting its Rate Stabilization Plan to Take Into Account the Variation in Hydro's Rural Revenues Resulting from Variations in the Rates Set by the Board to be Charged by Newfoundland Light & Power Co. Limited to its Customers," Board of Commissioners of Public Utilities, February 1993.*

[3] Newfoundland and Labrador Hydro, *System Planning Guideline: Assignment of Plant for Cost of Service*, Oct. 15, 2012.

and, simultaneously, realized system-wide “backbone” improvement in reliability. This integration has given rise to several characteristics not present with Hydro’s IIS and LIL/LTA/MF including: multi-directional flows, support for intermittent wholesale transactions, oversized facilities that provide for and accommodate ongoing growth in native retail loads over decades. Again, these characteristics of integration are not present in the immediate case: LIL and LTA are built for, and inseparable from, MF. On a practical level, Canadian utilities have followed this reasoning and functionalized HVDC facilities accordingly, or have functionalized generator leads as generation, as our report stated at page 35, line 14.